Supplementary Data

Green Extraction of Volatile Fatty Acids from Fermented Wastewater Using Hydrophobic Deep Eutectic Solvents

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1 Numerical values of the HDES density

Table S1. Measured density values of the hydrophobic deep eutectic solvent, DL-menthol: lauric acid (1.5:1), at the temperature range of 298.2 K – 368.2 K. The standard deviations were calculated from duplicate measurements.[a]

Temperature (K)	Freshly prepared density ($g \cdot cm^{-3}$)	Water saturated density ($g \cdot cm^{-3}$)
298.2	0.888 ±0.002	0.892 ±0.002
303.2	0.883 ±0.003	0.885 ±0.004
308.2	0.879 ±0.003	0.881 ±0.003
313.2	0.873 ±0.003	0.877 ±0.003
318.2	0.868 ±0.003	0.871 ±0.002
323.2	0.864 ±0.003	0.867 ±0.004
328.2	0.859 ±0.003	0.862 ±0.002
333.2	0.852 ±0.003	0.855 ±0.003
338.2	0.848 ±0.003	0.850 ±0.002
343.2	0.842 ±0.003	0.846 ±0.004
348.2	0.837 ±0.003	0.840 ±0.003
353.2	0.832 ±0.003	0.834 ±0.003
358.2	0.825 ±0.003	0.829 ±0.003
363.2	0.821 ±0.004	0.823 ±0.004
368.2	0.816 ±0.003	0.818 ±0.003

[a]Standard uncertainty in temperature and pressure u (T) = ±0.1, u(p) = 0.04 bar

2 pH Calculations

The pH is defined as the decimal logarithm of the reciprocal of the hydrogen ion activity. It can be calculated as:

$$\boldsymbol{pH = -log_{10}^{[H^+]}} \quad (1)$$

The calculations of hydrogen ion activity a solution containing acids are based on their acid's dissociation. For the case of acetic acid the dissociation equation is as follows:

$$\boldsymbol{CH_3COOH \leftrightarrow CH_3COO^- + H^+}$$

with a dissociation constant, K_a defined as:

$$\boldsymbol{K_a = \frac{[CH_3COO^-][H^+]}{[CH_3COOH]}} \quad (2)$$

Finding the hydrogen ion activity $[H^+]$ requires the solution of the equations as illustrated below:

$$\boldsymbol{let\ [H^+] = x}$$

Then: $[CH_3COO^-] = x$ and $[CH_3COOH] = [CH_3COOH]_0 - x,$ eq. (2) can be rewritten as:

$$\boldsymbol{x^2 + K_a x - [CH_3COOH]_0 K_a = 0} \quad (3)$$

Given that for acetic acid the dissociation constant, K_a at a temperature of 298.2 K equals to 1.8 $E^{-}5$, and knowing the concentration of acetic acid, $[CH_3COOH]$, the pH can be calculated by solving eq. (3) for $\boldsymbol{x}$.